

CHEM COURSE STUDENT LEARNING OUTCOMES

CHEM 100 - Molecules and Life in the Modern World

Students will be able to apply chemical principles in a laboratory setting to evaluate data collection and data interpretation.

Students will be able to evaluate societal issues from a natural science perspective and construct arguments about science-related topics and policies using principles of chemistry.

Students will be able to explain chemical principles and demonstrate quantitative and qualitative problem solving using those principles.

Students will be able to evaluate sources of scientific information and determine their validity using principles of chemistry.

CHEM 121 - General Chemistry I

Students will be able to apply the scientific method in a laboratory setting to evaluate data collection and data interpretation.

Students will be able to compare and contrast scientific measurement methods and apply basic mathematics and algebra to chemical concepts and problem solving.

Students will be able to explain and apply chemical principles of atomic structure, electron configurations, inorganic nomenclature, stoichiometry, reactions in aqueous solutions, thermochemistry, gas laws, and Lewis structures.

Students will be able to explain and predict patterns of chemical properties and reactivity.

CHEM 122 - General Chemistry II

Students will be able to apply basic mathematics and algebra to chemical concepts and problem solving.

Students will be able to apply the scientific method in a laboratory setting to interpret data and draw conclusions based on the course topics.

Students will be able to explain and apply chemical principles of intermolecular forces, kinetics, equilibrium, acid/base chemistry, thermodynamics, and electrochemistry.

Students will be able to explain and predict patterns of chemical properties and reactivity.

CHEM 198 - Special Topics in Chemistry

Students will be able to exhibit knowledge of the specific substantive area of chemistry being studied.

Students will be able to synthesize existing knowledge, abilities and skills with new practical skills while gaining theoretical understanding of the substantive area of chemistry being taught.

CHEM 220 - Introductory Organic Chemistry

Students will be able to interpret IUPAC names of organic compounds, draw correct structures from names and vice versa, and determine isomeric relationships between molecules.

Students will be able to use bonding concepts such as valency, polarity, resonance, and formal charge to predict and explain molecular shape, hybridization, physical properties, and reactivity of simple organic compounds.

Students will be able to predict products, reagents, or starting materials in simple acid-base, substitution, addition, elimination, and oxidation-reduction reactions applied to organic compounds.

Students will be able to interpret and apply organic structural and reactivity concepts to molecules of biological importance and complexity.

Students will be able to demonstrate safe laboratory practices and the application of the scientific method to draw conclusions using techniques for the preparation, purification, separation, and identification of organic compounds.

CHEM 241L - Organic Chemistry for Life Sciences Lab I

Students will be able to apply deductive reasoning regarding organic chemistry synthetic pathways and demonstrate this in a series of organic laboratory experiments utilizing proper laboratory techniques.

Students will be able to design, carry out, record and analyze the results of chemical experiments.

Students will be able to demonstrate safe laboratory procedures.

CHEM 242L - Organic Chemistry for Life Sciences Lab II

Students will be able to apply deductive reasoning regarding organic chemistry synthetic pathways and demonstrate this in a series of organic laboratory experiments utilizing proper laboratory techniques.

Students will be able to design, carry out, record, and analyze the results of chemical experiments.

Students will be able to demonstrate safe laboratory procedures.

CHEM 341 - Organic Chemistry for Scientists and Professionals I

Students will be able to sketch organic chemical structures from compound names (and vice-versa), distinguish isomers, and evaluate stereochemistry of those structures.

Students will be able to identify and explain intermolecular forces and bonding concepts including resonance and formal charges.

Students will be able to apply fundamental principles of thermodynamics, kinetics and acid-base behavior to organic reactions.

Students will be able to predict products, reagents, and starting materials in substitution, elimination, and addition reactions applied

to alkyl halides, alkenes and alkynes, correctly utilizing arrow pushing mechanisms, and applying stereo-, chemo-, and regioselectivity concepts.

Students will be able to propose simple multi-step organic syntheses.

Students will be able to predict organic functional groups from Infrared (IR) spectroscopy experiments.

CHEM 342 - Organic Chemistry for Scientists and Professionals II

Students will be able to predict starting materials, reaction conditions, and products in aromatic substitution reactions.

Students will be able to classify oxygen-containing organic functional groups including alcohols, ketones, aldehydes, and carboxylic acids, and illustrate their transformations through oxidation-reduction, addition and substitution reactions.

Students will be able to classify nitrogen containing functional groups including amines, amides, and nitriles through correct prediction of their structures, properties, and reactions.

Students will be able to interpret IR, NMR, MS, and UV/visible spectra of organic molecules.

Students will be able to demonstrate correct use of arrow-pushing mechanisms for complex multistep organic reactions involving multiple functional groups and including simple pericyclic reactions.

Students will be able to apply organic structural and reactivity concepts to molecules of biological importance.